

Attorney Docket No.: 0180367

In the Claims:

Claim 1 (previously presented): A method of forming an integrated circuit comprising:

- providing a semiconductor substrate;
- forming a gate dielectric on the semiconductor substrate;
- forming a gate on the gate dielectric;
- forming source/drain junctions in the semiconductor substrate;
- forming an ultra-uniform silicide having approximately less than 3% variation in thickness on the source/drain junctions and on the gate within a thermal budget having a temperature dependent upon a silicide metal;
- depositing an interlayer dielectric having contact holes therein above the semiconductor substrate;
- forming contact liners in the contact holes within the thermal budget for forming the ultra-uniform silicide; and
- forming contacts in the contact holes over the contact liners, whereby the contact liners are formed of a nitride of the material of the contacts.

Claim 2 (previously presented): The method as claimed in claim 1 wherein:

- forming the contact liners uses an atomic layer deposition process using a temperature not greater than approximately 400 degrees centigrade.

Claim 3 (canceled)

Claim 4 (previously presented): The method as claimed in claim 1 wherein:

forming the ultra-uniform silicide forms an ultra-uniform nickel silicide.

Claim 5 (original): The method as claimed in claim 1 wherein:

forming the contacts forms a tungsten material; and

forming the contact liners forms a tungsten nitride material.

Claim 6 (previously presented): A method of forming an integrated circuit comprising:

providing a semiconductor substrate;

forming a gate dielectric on the semiconductor substrate;

forming a gate on the gate dielectric;

forming source/drain junctions in the semiconductor substrate;

forming ultra-uniform nickel silicide having approximately less than 3% variation in thickness on the source/drain junctions and on the gate within a thermal budget having a temperature of less than about 400 degrees centigrade, the ultra-uniform nickel silicide being formed by using a very low power vapor deposition process;

depositing an interlayer dielectric having contact holes therein above the semiconductor substrate;

Attorney Docket No.: 0180367

forming tungsten nitride contact liners in the contact holes within the thermal budget for forming the ultra-uniform nickel silicide; and
forming tungsten contacts in the contact holes over the contact liners.

Claim 7 (previously presented): The method as claimed in claim 6 wherein:
forming the tungsten nitride contact liners uses an atomic layer deposition process using a temperature not greater than approximately 400 degrees centigrade.

Claim 8 (canceled)

Claim 9 (previously presented): The method as claimed in claim 6 wherein:
forming the ultra-uniform nickel silicide uses a nickel silicide metal having a thickness of not more than 50 Angstroms.

Claim 10 (original): The method as claimed in claim 6 wherein:
depositing the interlayer dielectric deposits a dielectric material having a dielectric constant selected from a group consisting of medium, low, and ultra-low dielectric constants.

Claim 11 (previously presented): An integrated circuit comprising:
a semiconductor substrate;
a gate dielectric on the semiconductor substrate;

Attorney Docket No.: 0180367

a gate on the gate dielectric;
source/drain junctions in the semiconductor substrate;
an ultra-uniform silicide having approximately less than 3% variation in thickness on the source/drain junctions and on the gate;
an interlayer dielectric having contact holes therein above the semiconductor substrate;
contact liners in the contact holes; and
contacts in the contact holes over the contact liners, whereby the contact liners are formed of a nitride of the material of the contacts.

Claim 12 (previously presented): The integrated circuit as claimed in claim 11 wherein:

the ultra-uniform silicide is an ultra-uniform nickel silicide.

Claim 13 (canceled)

Claim 14 (original): The integrated circuit as claimed in claim 11 wherein:

the interlayer dielectric is a dielectric material having a dielectric constant selected from a group consisting of medium, low, and ultra-low dielectric constants.

Claim 15 (original): The integrated circuit as claimed in claim 11 wherein:

the contacts in the contact holes are materials selected from a group consisting of tantalum, titanium, tungsten, copper, gold, silver, an alloy thereof, a compound thereof, and a combination thereof.

Claim 16 (original): The integrated circuit as claimed in claim 11 wherein:

the contacts are a tungsten material; and
the contact liners are a tungsten nitride material.

Claim 17 (previously presented): An integrated circuit comprising:

a semiconductor substrate;
a gate dielectric on the semiconductor substrate;
a gate on the gate dielectric;
source/drain junctions in the semiconductor substrate;
an ultra-uniform nickel silicide having approximately less than 3% variation in thickness on the source/drain junctions and on the gate,
an interlayer dielectric having contact holes therein above the semiconductor substrate;
tungsten nitride contact liners in the contact holes; and
tungsten contacts in the contact holes over the contact liners.

Claim 18 (canceled)

Claim 19 (original): The integrated circuit as claimed in claim 17 wherein:
the interlayer dielectric is a dielectric material having a dielectric constant selected from a group consisting of medium, low, and ultra-low dielectric constants.

Claim 20 (original): The integrated circuit as claimed in claim 17 wherein:
the nickel silicide further comprises arsenic doping.

Claim 21 (previously presented): The method as claimed in claim 1 wherein:
forming the ultra-uniform silicide includes depositing the silicide metal using a vapor deposition process with a power level below 500 watts direct current.

Claim 22 (previously presented): The method as claimed in claim 1 wherein:
forming the ultra-uniform silicide includes depositing the silicide metal at a deposition rate below approximately 7.0 Angstroms per second.

Claim 23 (previously presented): The method as claimed in claim 1 wherein:
forming the ultra-uniform silicide uses a nickel silicide metal having a thickness of not more than 50 Angstroms.

Attorney Docket No.: 0180367

Claim 24 (previously presented): The method as claimed in claim 6 wherein:
forming the ultra-uniform nickel silicide includes depositing a nickel silicide metal
at a deposition rate below approximately 7.0 Angstroms per second.